The Newfoundland Lobster Fishery: A Review of Statistics, Stock Status and Current Management Considerations

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by

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ABSTRACT

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A brief historical review of the Newfoundland lobster fishery including trends in catch and effort, particuarly since 1976 when a limited entry licencing policy was implemented, is presented. The general status of the stocks and current management considerations, particularly those related to biological concerns are discussed.

Key words: lobster fishery, statistics, stock status, management considerations

RÉSUMÉ

Ennis, G. P. 1982. The Newfoundland lobster fishery: A review of statistics, stock status and current management considerations. Can. MS Rep. Fish. Aquat. Sci. 1666: iv + 11 p.

Ce rapport présente un bref aperçu historique de la pêche du homard à Terre-Neuve, y compris les tendances des prises et de l'effort, surtout depuis 1976, année d'entrée en vigueur d'une politique concernant la délivrance de permis de pêche à accès limité. On traite de la situation générale des stocks et de questions d'actualité en matière de gestion, notamment celles liées aux problèmes biologiques.

INTRODUCTION

Serious concern with the depressed state of the lobster fishery in certain areas of Atlantic Canada led to the establishment of a Lobster Fishery Task Force in 1974 to investigate various aspects of the fishery and make recommendations for an appropriate management program. The main impact of the final report of this task force (Anon. 1975) on management of the Newfoundland lobster fishery was the implementation in 1976 of a limited entry licencing policy. This policy also restricted fishermen who were issued licences to the use of no more than the number of traps they had stated on their 1975 licence applications that they intended to fish that season.

A Newfoundland Lobster Fishery Advisory Committee was established in 1977 to review all aspects of the management of the Newfoundland fishery and provide advice to the Regional Director-General aimed at improving its overall management.

This paper reviews historical trends in catch and effort in the Newfoundland lobster fishery, particularly developments since 1976, general status of the stocks, and current management considerations, particularly those related to biological concerns.

HISTORICAL LANDINGS AND EFFORT

Official records indicate that the lobster fishery began in Newfoundland in 1874 with around 150,000 lb. (68 MT) landed (Fig. 1). Landings increased rapidly to a peak of 17.5 million lb. (7938 MT) in 1889. There were a number of periods of sharp fluctuations in subsequent years but there was a distinct downward trend and by 1924 landings had declined to around 750,000 lb. (340 MT). During these early years the catch was processed in many small canning operations located all around the coast. Although there were regulations defining a minimum legal size and protecting berried females, they were unenforceable and early documentation indicates that virtually everything that was caught was processed.

Following a 3-year closure (1925-27), landings increased to 4.6 million lb. (2087 MT) in 1928, but the recovery was short lived and landings dropped sharply the following year. Starting in the early 1930's lobsters were shipped live to the U.S. market where size limit and berried female regulations were strictly enforced. By the early 1950's virtually all of the landings were shipped live to the U.S. market and the fishery has remained a live market industry since then. Landings increased to around 5 million lb. (2268 MT) by 1949 possibly because of increased effort but more likely because of increased recruitment resulting from the degree to which the size limit and berried female regulations became enforceable.

Compared to the dramatic fluctuations in landings which occurred during the earlier years of the fishery, landings since 1949 have been relatively stable. However, the stability has been relative only. From a high of 5.5 million lb. (2495 MT) in 1955 landings declined to around 2.7 million lb. (1225 MT) in 1972 which was the lowest level of landings since 1945. Between 1972 and 1979 landings increased dramatically to 5.7 million lb (2586 MT) which was the highest level of landings since 1912. Landings dropped slightly but remained in excess of 5 million lb. (2268 MT) in 1980 and 1981.

Up until 1976, effort, in terms of both licences and the number of traps that could be fished per licence, was uncontrolled. As indicated by the number of traps fishermen stated on their licence applications that they intended to fish each year, effort increased dramatically after 1955. This measure of effort was discontinued after 1973. A limited entry licencing policy was implemented in 1976 and fishermen who were issued licences were restricted to the number of traps they had stated on their 1975 licence application that they intended to fish that year. This number was far in excess of the 1973 number and the consensus among Fishery Officers and among fishermen is that the number of traps actually used (which would likely be comparable to the 1973 and earlier effort data) is substantially in excess of the number allowed as per the licencing policy. While the number of licences issued has dropped from 5410 in 1976 to 4444 in 1981, the number of traps allowed in 1981 (667,065) is still considerably in excess of the 1973 number and its appears that the number of traps actually used has increased substantially over the 1976 to 1981 period.

It appears that the dramatic increase in landings from 1972 to 1979 has resulted from increased exploitation rates due to the tremendous increase in effort. Catch rates on the traditionally productive fishing grounds have been reduced to the point where effort has been spreading to low or marginally productive areas that were not fished or fished very lightly in the past. It seems likely that the contribution to recent landings from this source is significant.

It is also possible that the increased landings during the 1970's resulted, at least in part, from increased recruitment. Recent analyses of the time series of data that has accumulated from ongoing studies of lobster population dynamics in the Comfort Cove, Notre Dame Bay area (one of five such localized study areas around Newfoundland) has shown that in this area, despite very high exploitation rates, recruitment increased substantially over the 1972 to 1978 period. The cause of this increased recruitment cannot be determined with certainty. Environmental conditions for survival of larvae to settlement or for survival and growth of postlarval and early juvenile stages may have been much better than average during the mid to late 1960's. Another possibility is improved conditions (e.g. reduced competition) for growth and survival of early juveniles and prerecruits because of low levels of recruit abundance, as indicated by commercial landings, during the early 1970's.

How widespread the increased recruitment was during the 1970's is not known. Substantial increases in landings occurred in Notre Dame, Bonavista, Placentia and Fortune bays and along the southwest coast (Statistical Area J), but there is no way to determine how much of the increase was due to increased recruitment and how much was due to increased effort.

STATUS OF THE STOCKS

The catch and effort data that are available for the lobster fishery in Newfoundland are not amenable to analysis using surplus yield models which would give a reliable indication of MSY and associated fishing effort. Possibly suitable data are only available for the period 1953-73. In addition to the absence of effort data for much of the earlier period, there were substantial changes in the nature of the fishery and in regulatory measures and their

enforcement over the first 80 years. Yield per recruit assessments clearly indicate that current exploitation rates are considerably in excess of those that would maximize yield per recruit at the current minimum legal size. In addition, egg production, and presumably subsequent recruitment to the stocks, is substantially less under current conditions than that which would occur with an exploitation rate and minimum legal size that would maximize yield per recruit. There is no doubt that were a surplus yield analysis possible, it would show that current effort is substantially greater than that associated with MSY and current yields are substantially less than MSY.

MANAGEMENT CONSIDERATIONS

STOCK RECRUITMENT

In some lobster fisheries the current minimum legal size is below the smallest size at which females lay eggs and with the very high exploitation rates that generally prevail in lobster fisheries, the possibility of recruitment failure is very real. In Newfoundland waters, however, egg-bearing females as small as 65 mm carapace length, well below the minimum legal size of 81 mm, have been observed and no matter how high exploitation rates become a portion of the spawning stock is protected. This begs the question: does this situation eliminate the possibility of recruitment failure in Newfoundland stocks? The best answer at the present time is that it is highly unlikely that this minimum level of spawning stock would supply sufficient recruitment for landings to be sustained at recent levels. Landings comparable to recent levels were taken in 1954 and 1955 at considerably lower levels of effort (and presumably much lower exploitation rates) which means that overall abundance (including spawning stock) was much higher than at the present time. This higher level of spawning stock did not ensure against the decline in abundance that followed during the next 20 years. While it is possible that less than favourable environmental conditions for growth and survival of larval and juvenile lobsters prevailed during the period, it is more likely that recruitment overfishing was the basic cause of the decline. Although a substantial proportion of female lobsters within 10 mm carapace length below the minimum legal size lay eggs, lobsters at this size have relatively low fecundity and as overall abundance declines the size of the sublegal spawning stock declines as well. It is clear that the spawning stock protected by the minimum size regulation cannot be depended upon to supply sufficient recruitment to prevent a long-term decline in abundance.

Reference was made earlier to the fact that much of the increased effort in recent years has been spreading to low or marginally productive areas that were not fished or fished very lightly in the past. While lobsters may be relatively scarce in such areas, in the absence of heavy exploitation they would grow to large sizes. Since fecundity increases exponentially with size, and since the majority of these females would have a chance to lay eggs several times before being caught, the relative egg production per female would be far greater than under conditions of high exploitation rates. It is not unlikely that in the past at least, these "refugia" supplied a substantial proportion of the annual egg production in the population as a whole. Egg production can be increased subtantially by increasing the size limit and/or by reducing exploitation rates. While stock-recruitment relationships as well as recruitment mechanisms in lobsters are poorly known, it has to be assumed that, within the

limits of the carrying capacity of the lobster habitat, increased egg production will result in increased recruitment to the stock. There is no doubt that lobster habitat around Newfoundland is capable of carrying a substantially higher level of lobster abundance than it does at the present time.

FUTURE TRENDS/STABILITY

The analysis of data from the study of lobsters at Comfort Cove demonstrated that as much as 91% of the standing stock in a given season was recruited since the preceding fishing season. In any fishery that is so heavily dependent on recruitment, slight variation in recruitment can result in substantial fluctuations in landings from year to year. Even under an ideal fisheries management regime, natural fluctuations in abundance of lobsters (and hence landings) will occur, but under a management regime that is characterized by excessive exploitation rates and a minimum legal size that is too small, fluctuations can be expected to be far more dramatic.

There seems little doubt that if the fishery was properly managed, yields from the Newfoundland lobster resource could be sustained at least at recent levels of landings and possibly higher. However, if current conditions continue, all that can be expected over the long term is a downward trend similar to but probably steeper than that which occurred between 1955 and 1972.

"OPTIMUM" EFFORT

The Newfoundland Lobster Fishery Advisory Committee was established in 1977. It was very clear from the outset that the greatest problem to be faced in trying to properly manage the fishery was the excessive number of traps being used. The Committee has made a number of recommendations aimed at reducing effort to an "optimum" or perhaps better stated "reasonable" level. It was recognized that a moderate reduction would result in a significant improvement in the economics of the fishery but that a very large reduction would be reqiured to achieve any significant reduction in exploitation rates. It was recognized as well that there were no overnight solutions to the problem and that reducing effort to an "optimum" level would probably have to be a long-term process.

In order to develop a long-term management plan, it was first of all necessary to define the "optimum" level of effort in terms of the number of traps to be used. It was explained earlier that data which could be used in a mathematical model to estimate the level of effort associated with MSY are not available for the Newfoundland lobster fishery. However, the catch and effort data available since 1955 do provide a basis for making a pretty fair judgement as to what an "optimum" level might be. It can be seen in Fig. 1 that landings comparable to recent levels (i.e. 5.5 million lb) were taken in the mid 1950's with around 300,000 traps in use. A figure for traps in use in recent years that would be comparable is at least 700,000 and is likely to be substantially higher. Clearly, abundance must have been substantially higher in the mid 1950's for comparable landings to have been taken with far less effort. In relation to recent conditions, those that prevailed during the mid 1950's could certainly be considered "optimum".

The catch and effort data shown in Fig. 1 for the Island as a whole are available for Statistical Areas (Fig. 2) since 1953. These data (Fig. 3 and 4) were examined as above in an effort to arrive at an "optimum" number of traps for each area. For some areas "optimum" conditions were not as readily apparent as those for the Island as a whole as depicted in Fig. 1. There was a tendency to be liberal and when the "optimum" number of traps was determined for each area they totalled 423,000. These levels of effort were accepted by the Advisory Committee as being reasonable approximations of the "optimum" for each area and levels towards which management should aim. The assumption being that as effort is reduced so will the exploitation rate which will allow a gradual increase in abundance to the point where recent levels of landings could be taken at the "optimum" level of effort.

A need for smaller Lobster Districts, so that managers could respond more readily to localized needs and conditions, was also recognized. To this end a proposal was made to establish 12 districts, instead of the existing four (Fig. 5, Table 1).

In addition to maintaining the existing licencing policy and possibly making it more restrictive, the Committee felt that establishing traps limits would be very useful in reducing effort. Trap limits were proposed for each district based on a consideration of historical and recent landings, current number of licences and traps, average landings, etc. and recognizing that, because of the relatively low degree of enforceability of a trap limit regulation, in order to be effective, trap limits would have to be acceptable to the majority of fishermen in each district. These proposed trap limits (Table 1) were endorsed by the Advisory Committee. With an "optimum" level of effort and an individual trap limit defined for each district, it was possible to define the "optimum" number of licences that should be issued (Table 1). It is quite clear that a considerable amount of effort has to be eliminated from the fishery before an "optimum" situation is achieved.

REFERENCE

Anon. 1975. Lobster Fishery Task Force Final Report. March 1975. 180 p.

Table 1. Summary of districts, "optimum" levels of effort, and trap limits proposed by the Newfoundland Lobster Fishery Advisory Committee.

Proposed lobster fishing area	Statistical areas or sections included	"Optimum" level of effort (No. traps)	1981 level of effort (# traps registered)	Proposed trap limit	"Optimum" number of licences	No. of licences in 1981
3	Area A, excluding Section 1	2,000	1,390	100	20	11
4	Area B	110,000	193,033	200	550	1,276
5	Area C	30,000	47,209	200	150	394
6	Area D	4,000	10,262	100	40	157
7	Area E	5,000	12,885	100	50	156
8	Area F	2,000	3,600	100	20	38
9	Area G	3,000	5,925	100	30	55
10	Area H	35,000	57,744	150	233	486
11	Area I, plus Section 36, 37	40,000	43,879	150	267	433
12	Section 38, 39	2,000	5,303	100	20	88
13	Areas K, L	80,000	106,187	200	400	626
14	Areas M, N plus Section 1	110,000	179,073	300	367	721
Totals		423,000	667,065		2,147	4,444

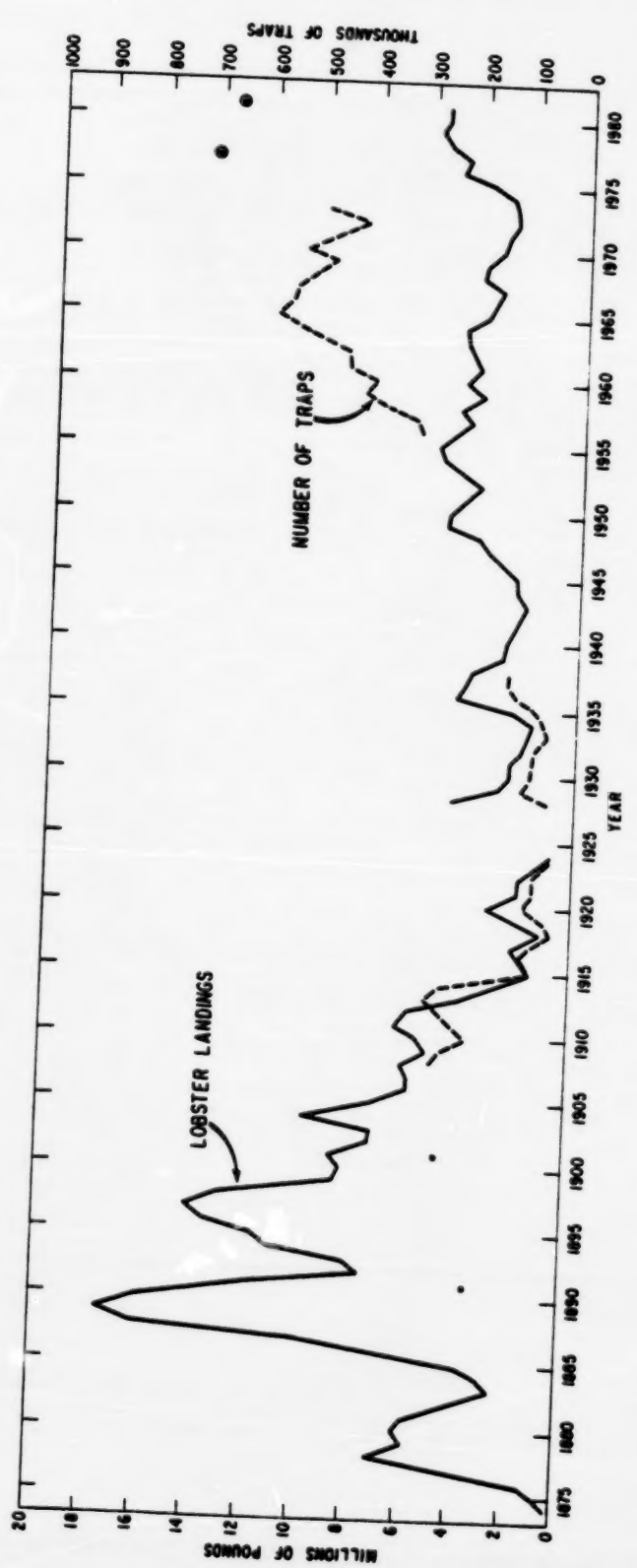

Fig. 1. Historical data on landings and effort in the Newfoundland lobster fishery. Circled points indicate the number of traps that licenced fishermen are permitted to use as per the 1976 licencing policy.

Fig. 2. Newfoundland fisheries statistical areas.

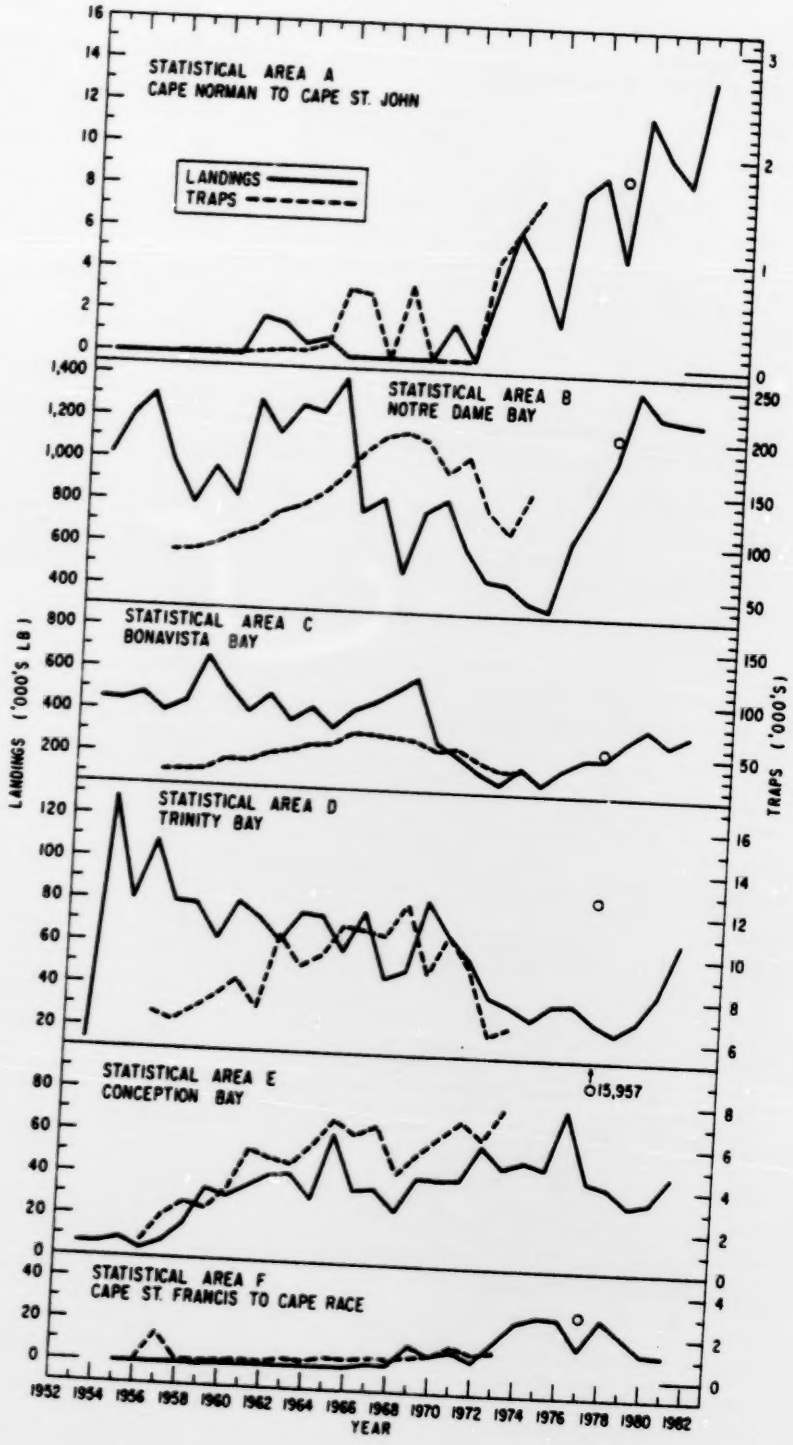

Fig. 3. Data on landings and effort for Statistical Areas A to F 1953 to 1981.

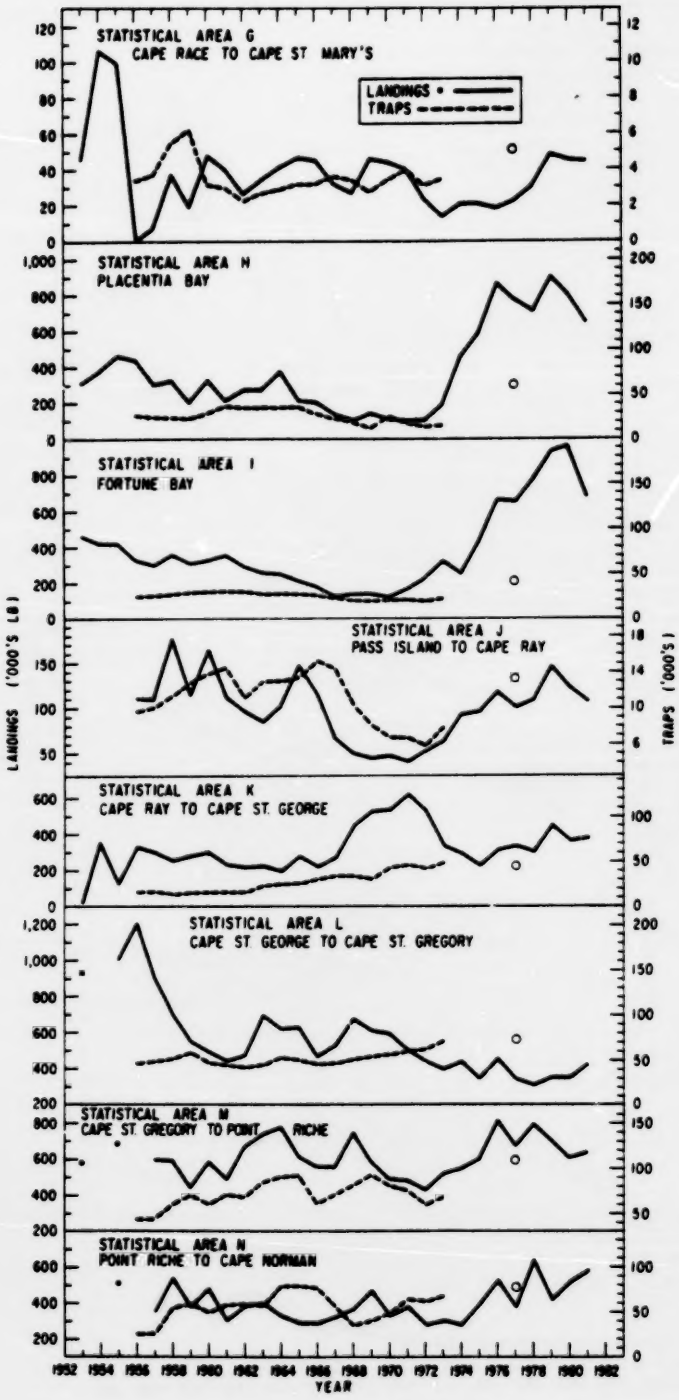

Fig. 4. Data on landings and effort for Statistical Areas G to N.

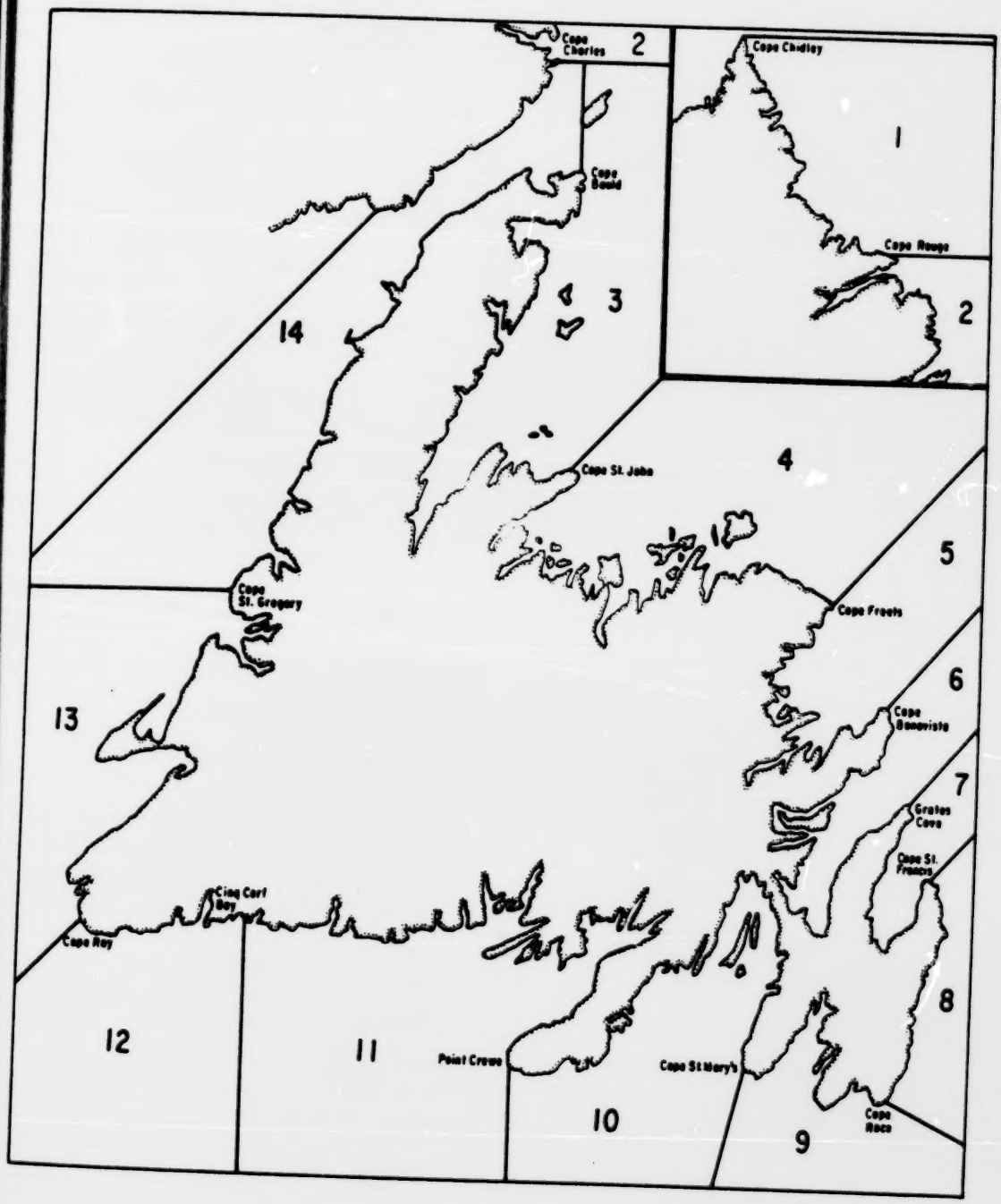

Fig. 5. Proposed Newfoundland lobster fishing districts.